REMARKS

Summary of the Office Action

Claims 1, 3 and 8 are rejected under 35 U.S.C. § 102(b), as being anticipated by U.S. Patent No. 4,195,699 to Rogers et al. ("Rogers"), or alternatively under 35 U.S.C. § 103(a) as being unpatentable over Rogers in view of U.S. Patent No. 5,934,387 to Tuunanen.

Claim 7 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Rogers in view of Tuunanen, and further in view of U.S. Patent No. 5,757,358 to Osga.

Claims 2 and 4-6 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Summary of the Response to the Office Action

Claims 1 and 3-8 have been amended.

Claim 2 remains as originally presented.

New claims 9-14 have been added.

Accordingly, claims 1-14 are pending for consideration.

All Claims Define Allowable Subject Matter

The indication that claims 2 and 4-6 recite allowable subject matter is greatly appreciated. In accordance with the Examiner's helpful suggestion, new claims 9 and 10 recite in independent form the features of claims 2 and 4, respectively. New claims 11 and 12, which correspond to claims 5 and 6, respectively, depend from new independent claim 10. Thus, claims 9-12 are respectfully submitted to be allowable.

Claims 1, 3 and 8 are rejected under 35 U.S.C. § 102(b) as being anticipated by Rogers or, alternatively, under 35 U.S.C. § 103(a) as being unpatentable over Rogers in view of Tuunanen. Claim 7 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Rogers in view of Tuunanen, and further in view of Osga. These rejections are respectfully traversed in view of the above amendments and the following comments.

It is respectfully submitted that Rogers fails to teach or suggest each and every feature recited in independent claims 1, 3 and 8.

First, independent claims 1, 3 and 8 have been amended to recite combinations of features that each include, *inter alia*, "at least two simultaneously active control modes with different control strategies" and prioritizing one control mode over the other control modes "such that an affect of the prioritized control mode increases and simultaneously affects of the other control modes diminish." Support for these combinations of features may be found in Applicants' specification at, for example, paragraph 0011. Specifically, a user interface according to preferred embodiments of the present invention shows how "prioritising one control mode also affects the other target criteria of drilling" and "prioritising one control mode automatically diminishes the importance of the other modes."

Rogers fails to teach or suggest at least two simultaneously active preformed control modes. The Office Action refers to Rogers' statement "...that the two drilling parameters, i.e., drill thrust and drill speed (RPM), are independently operative variables..." (column 2, lines 2-4); and further refers to Rogers' statement at column 2, lines 5–13, that:

> "...the present method utilizes a searching program for the optimized penetration rate which encompasses the incremental change of one of the variables noted above while retaining the other variable in a constant state. When the penetration rate has been maximized for the one variable being changed, the process of parameter variability is then applied to the previously unchanged variable while the previously changed variable is held constant."

It is respectfully submitted that Rogers teaches that drill thrust and drill speed are drilling parameters/variables, which are varied when Rogers' solitary control mode, namely searching for the optimized penetration rate, is executed. Moreover, the Office Action asserts that "Rogers clearly discloses that at least two simultaneously active control modes, drill speed (RPM) and thrust (B), with different control strategies (by incrementally changing of one of these variable while retaining the other variable in a constant state)." Rogers is therefore contradictory to amended claims 1, 3 and 8, wherein none of the simultaneously active control modes is kept constant when Applicants' prioritizing is executed.

The Office Action also refers to paragraph 0024 of Applicants' disclosure, which describes an optimization mode M4, and compares it with Rogers. However, M4 is but one single control mode – additional control modes M1 to M3 are described in paragraphs 0021-0023. It is respectfully submitted that by virtue of the comparison of Rogers to only one of

Applicants' control modes, the Office Action implicitly acknowledges that Rogers teaches or suggests only one single control mode. Again, Applicants' claims 1, 3 and 8 recite that at least two simultaneously active preformed control modes are used in control.

Second, independent claims 1, 3 and 8 each recite combinations of features that include, *inter alia*, "control modes with different control strategies" and "each control mode determining at least one criterion to be measured during drilling, a threshold value for a measurement result, and at least one adjustable operating parameter." It is respectfully submitted that Rogers' drill thrust and drill speed are not control modes in the sense of the independent claims 1, 3 and 8.

It is respectfully submitted that Rogers' drill thrust and drill speed do not include any different control strategies, but are just single measurable variables to be varied according to an external control strategy. According to Rogers (*See*, e.g., column 2, lines 5–13), the only control strategy is to incrementally change one variable while retaining the other variable in a constant state and thereby to search for the optimized penetration rate. It is respectfully submitted that Rogers fails to teach or suggest a control strategy that is determined in the drill thrust and, on the other hand, a control strategy that is determined in the drill speed.

Rogers' solitary drilling parameter/variable does not include any strategy for controlling drilling. Insofar as drill thrust and drill speed are Rogers' only adjustable drilling parameters/variables, it is respectfully submitted that Rogers fails to teach or suggest that drill thrust and drill speed determine other adjustable parameters/variables.

Further, Rogers' drill thrust and drill speed do not include any threshold value for a measurement result. Again, Rogers discloses that "[w]hen the penetration rate has been maximized for the one variable being changed, the process of parameter variability is then applied to the previously unchanged variable while the previously changed variable is held constant." Thus, there are no preset threshold values for measurement results of the drill thrust of the drill speed, but they are changed one by one as long as the change increases the penetration rate, which is Rogers' only aim. It is respectfully submitted that Rogers fails to teach or suggest a "threshold value for a measurement result," as recited in Applicants' independent claims 1, 3 and 8.

Nonetheless, in order to expedite prosecution, claim 1 has been amended to particularly point out and distinctly claim the difference between operating parameters and control modes by

reciting "the rock drilling having operating parameters including impact, feed, rotation, and flushing." Support for this amendment may be found in Applicants' specification at, for example, paragraphs 0003 and 0032.

Additionally, claim 3 has been amended to particularly point out and distinctly claim that a rock drilling apparatus includes a carrier, a feeding beam, and a rock drill that is movable with respect to the feeding beam, as well as a control system. It is respectfully submitted that Rogers fails to teach or suggest each and every feature of Applicants' rock drilling apparatus as recited in amended independent claim 3.

Independent claim 8 has also be amended to particularly point out and distinctly claim that the at least two simultaneously active control modes may further include "a control mode to ease unscrewing threaded connections between drilling components, and a control mode to minimize vibration occurring in the rock drilling apparatus." Support for these features may be found in Applicants' specification at, for example, paragraphs 0022 and 0023.

For at least any of the above reasons, it is respectfully submitted that the rejections under 35 U.S.C. § 102(b) of independent claims 1, 3, and 8 should be withdrawn, and that these claims are allowable over Rogers.

Tuunanen is cited for allegedly teaching or suggesting drilling equipment. However, Tuunanen still fails to overcome the deficiencies of Rogers discussed above. As such, Rogers and Tuunanen, whether considered individually or in combination, fail to teach or suggest each and every feature of Applicants' invention as recited in independent claims 1, 3, and 8.

For at least any of the above reasons, it is respectfully submitted that the alternative rejections under 35 U.S.C. § 103(a) of independent claims 1, 3, and 8 should also be withdrawn, and that these claims are allowable over Rogers in view of Tuunanen.

Claim 7 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Rogers in view of Tuunanen, and further in view of Osga. Osga is cited for allegedly teaching or suggesting that it is somehow obvious to select only the closest object. However, even if Osga could be combined with the teachings of Rogers and Tuunanen, a proposition that Applicants do not accept, the combination would still fail to overcome the deficiencies of Rogers and Tuunanen as discussed above. For example, Osga fails to teach or suggest that at least two simultaneously active control modes are selected at the same time, or that one control mode is prioritized over

others. Moreover, Osga shows symbols that represent real world objects, which are not predisposed in desired places.

For at least any of the above reasons, it is respectfully submitted that the rejections under 35 U.S.C. § 103(a) of claim 7 should be withdrawn, and that this claim is allowable over Rogers, Tuunanen, and Osga.

New claims 13 and 14 are respectfully submitted to also be allowable over the applied prior art for at least the following reasons. New claims 13 and 14 recite combinations of features that each include, *inter alia*, "at least two simultaneously active control modes with different control strategies" and "one control mode can be prioritizing over the other control modes." Additionally, new claim 13 recites a user interface with "an operating area of the shape of a line segment," which is neither taught nor suggested by any of the applied references, whether considered individually or in combination. Support for the combination of features recited in new claim 13 may be found in Applicants' specification at, for example, paragraph 0030. New claim 14 additionally recites that the at least two simultaneously active control modes are selected from "a drilling efficiency mode, a quality mode, and a cost mode." It is respectfully submitted that the applied references, whether considered individually or in combination, fail to teach or suggest the combination of features recited in new independent claim 14. Support for the combination of features recited in new claim 14 may be found in Applicants' specification at, for example, paragraphs 0021-0023.

With regard to the meaning of several terms, the New Oxford Dictionary of English defines "mode" as "a way or manner in which something occurs or is experienced, expressed or done," and further as "an option allowing a change in the method of operation of a device." It is respectfully submitted that these definitions are precisely what is meant by "mode" as it is used in the present application.

The New Oxford Dictionary of English also defines "parameter" as "a numerical or other measurable factor forming one of a set that defines a system or sets the conditions of its operation." In the present application (e.g., paragraphs 0003 and 0032), the operating parameters of rock drilling may include impact pressure, feed pressure, feed flow, rotation pressure medium flow, rotation pressure, and flushing pressure and flow. Rogers states that thrust (feed) and drill

speed are drilling parameters/variables, which is completely consistent with the present application and the cited dictionary.

It is respectfully submitted that Rogers uses the term "variable" as a synonym for the term "parameter." The New Oxford Dictionary of English defines "variable" as "not consistent or having a fixed pattern; liable to change; able to be changed or adapted; a factor that is liable to vary or change." Thus, it is respectfully submitted that Rogers' drill thrust and speed are variables, as opposed to "preformed control modes" recited in Applicants' claims.

The Office Action also asserts "the drill speed and thrust are inputs that can be varied to effect the operation of the drilling." Regardless, this assertion implies that they are "adjustable operating parameters," rather than the "preformed control modes" as described and claimed in the present application.

Examples of different control modes are presented at, for example, paragraphs 0021-0024 of the present application. The control modes may be, for instance, the drilling efficiency mode, the quality mode, the cost mode, and the optimization mode. However, Rogers describes only one control mode (*See*, for example, column 1, lines 60-68). The strategy of this single mode is "optimizing the rate of penetration of a drill." Insofar as the entirety of Rogers emphasizes the importance of only this single strategy, it is respectfully submitted that it would be contrary to the teaching of Rogers to use at least two simultaneously active control modes with different control strategies.

Consequently, since Rogers fails to teach or suggest several simultaneously active control modes, it is of course impossible to weight the importance of one control mode by prioritizing it, and still keep the other control modes simultaneously active, but with diminished affects relative to the prioritized control mode, which is the weighted control mode.

On the other hand, Rogers appears to equate the importance of the variables drill speed and thrust when optimizing the penetration rate. Even if thrust and drill speed are to be considered control modes, as the Office Action asserts but Applicants do not accept, Rogers would still fail to teach or suggest Applicants' prioritizing of one mode over the other. Instead, Rogers appears to teach only that thrust and drill speed have equal importance.

The Office Action also asserts that the control modes recited in Applicants' independent claim 8 are interrelated and cannot be separated. It is respectfully submit that there is no justification for this assertion.

The Office Action refers to the operating parameters of drilling thrust and speed, which are the only two operating parameters addressed by Rogers. However, it is well understood that there are additional adjustable operating parameters of rock drilling; including impact and flushing. All four such operating parameters are typically varied in order to control the drilling as defined in the control modes.

As a person skilled in the art knows, rock drilling is a complex process to be controlled. When adjusting individual parameters, the operator cannot perceive the effect of the adjustment measures to the entire drilling situation. Adjustment of a single parameter may affect positively a certain target criteria representing the success of drilling, but it can simultaneously affect other target criteria negatively. For example, an increase in impact power expedites drilling and thus reduces the costs of drilling, but unfortunately the service life of the drilling equipment simultaneously decreases, which in turn adds considerably to the costs of drilling.

In contrast to the applied prior art, and Rogers in particular, the control modes of the present invention clearly describe to an operator, how an individual control action affects the entire drilling situation. Furthermore, the operator can weight, in a simple manner, a control mode he considers to be important. Such features are neither recognized nor addressed by the applied prior art.

CONCLUSION

In view of the foregoing, Applicants submit that the pending claims are in condition for allowance, and respectfully request withdrawal of all outstanding rejections, and request the timely allowance of the pending claims. Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact Applicants' undersigned representative to expedite the prosecution.

EXCEPT for issue fees payable under 37 C.F.R. § 1.18, the Commissioner is hereby authorized by this paper to charge any additional fees during the entire pendency of this application including fees due under 37 C.F.R. § 1.16 and 1.17 which may be required, including any required extension of time fees, or credit any overpayment to Deposit Account No. 50-0573. This paragraph is intended to be a **CONSTRUCTIVE PETITION FOR EXTENSION OF TIME** in accordance with 37 C.F.R. § 1.136(a)(3).Applicants respectfully request entry of the amendment under 37 C.F.R. § 1.116 by the Examiner, placing all pending claims in condition for allowance. Applicants submit that the amendment does not raise new issues or necessitate additional search of the art by the Examiner.

Respectfully submitted,

DRINKER BIDDLE & REATH LLP

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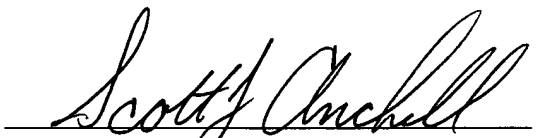
By: 

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